

Exhibit 10 to the Request for Ex Parte Re-examination of

In re Patent No: 6,208,271

Issued: March 27, 2001

Applicant: Brad A. Armstrong

Title: Remote Controller with Analog Button(s)

公開実用平成 1- 62627

④日本国特許庁 (JP)

④実用新案出願公開

④公開実用新案公報 (U) 平1-62627

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審査請求 有 (全頁)

④考案の名称 可変抵抗型ラバースイッチ

④実 願 昭62-166738

④出 願 昭62(1987)10月15日

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④代理人 弁理士 松田 省躬



明細書

1. 考案の名称 可変抵抗型ラバースイッチ

2. 実用新案登録請求の範囲

電極と接点部が相対向して配置されているスイッチにおいて、接点部が弾性の導電ゴムであって、電極と対向する表面が平坦となっていない可変抵抗型ラバースイッチ。

3. 考案の詳細な説明

「産業上の利用分野」

本考案は、各種エレクトロニクス機器のスイッチに使用される接点部の改良に関するものである。

従来の弾性の導電ゴムを接点部に使用した電極と接点が相対向するように配置されたいわゆるラバースイッチは、ON-OFF型のスイッチである。

この従来のスイッチには、スイッチを押す力の大小に応じて、機器の動作の状態を変化させる機能は有していない。

〔考案の構成〕

そこで本考案は、接点の弾性導電ゴムの電極と



対向する表面を平坦面とせず、例えば球状または円周状あるいは直径方向に溝を設けた表面とすることにより、スイッチを押す力に応じて、導電弾性体と電極との接触面積に変化を与えることにより抵抗値の変化が得られるようにしたものである。

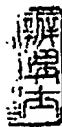
導電接点ゴムは、弾性体であるので押圧力が加わるとたわみ、導電接点ゴムと電極との接触面積が大となる。電極の抵抗は、導電接点ゴムとの接触面積に反比例するから、圧力が加わるに従い抵抗値が下がる。

実施例 1

次に第1(1)図に示す実施例に従って説明する。

絶縁性の弾性ゴムからなる中空の円錐形状のバネ1の内面天井部に導電性の導電弾性体から成る導電接点ゴム2が同時成型あるいは接着等により形成されている。この導電接点ゴム2は半球状に凸となつた形状としてある。3はプリント基板である。

第1(2)図は、少し押圧した状態を示し、第1(3)図は、完全に押圧した状態を示す。



そして第2図は、第1図の導電接点ゴム2の位置に対応した電極4との接触面積の変化を示しており、それぞれ押圧力に応じて導電接点ゴムがたわみ、接触面積が変化する。

第1(1)図の押圧していない状態が、第2(1)図に示され、第1(2)図の半分押圧した状態では、第2(2)図のように、わずかの面積のみしか導電接点ゴム2と電極4とが接触しておらず、第1(3)図の完全に押した状態では、第2(3)図に示すように大面積にわたり接触している。

実施例2

第3図には、第1図とは別の実施例を示す。

この実施例では、中空の円錐形状の絶縁ゴムのバネ5の内面天井に形成した導電接点ゴム6が、環状に凹凸が付けてある。そしてこのスイッチにおける押圧力に応じた導電接点ゴム6とプリント基板の電極7との接触面積の変化を第4図に示しており、第4(1)図は押圧していない状態であり、第4(2)図が半分押圧した状態であり、第4(3)図が完全に押圧した状態を示す。

〔考案の効果〕

このように構成することで、スイッチの押圧力に応じて導電接点ゴムがたわみ、電極との接触面積が変化し、抵抗値が変わることにより、単にスイッチングのON—OFFのみでなく機器の動作状態を変化させる機能をもたせることが可能となる。

第5図には、従来のスイッチと本考案のスイッチとの押圧力と抵抗値との関係の違いをグラフに示してある。

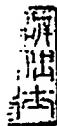
4. 図面の簡単な説明

第1図は、スイッチの押圧力に応じた変化状態を示す構造概略図。

第2図は、スイッチの押圧力に応じた導電接点ゴムと電極との接触面積の変化状態を示す図。

第3図は、別の実施例を示すスイッチの構造概略図。

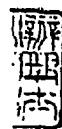
第4図は、第3図のスイッチにおける押圧力に応じた導電ゴムと電極との接触面積の変化状態を示す図。



第5図は、押圧力と抵抗値の関係を示す図。

1 …… バネ	2 …… 导電接点ゴム
3 …… プリント基板	4 …… 電極
5 …… バネ	6 …… 导電接点ゴム

実用新案登録出願人 富士ゴム、株式会社
代理人 弁理士 松山省躬

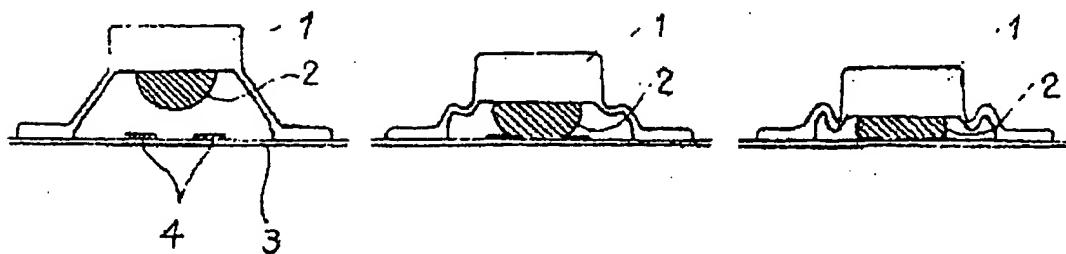


第1図

(1)

(2)

(3)

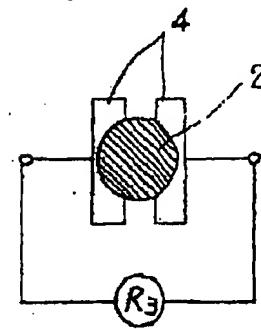
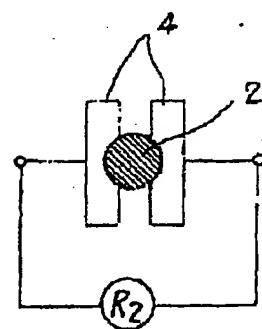
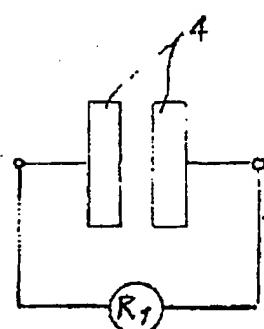


第2図

(1)

(2)

(3)



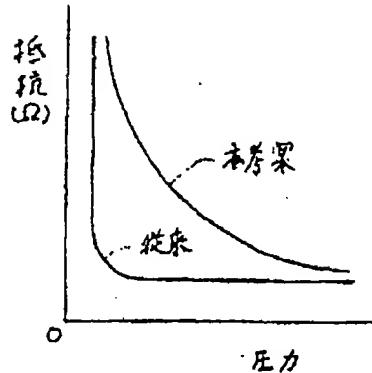
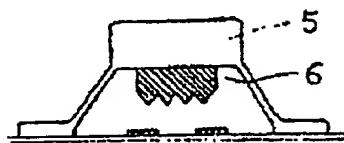
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新開

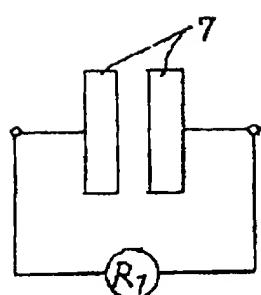
第 5 図

第 3 図

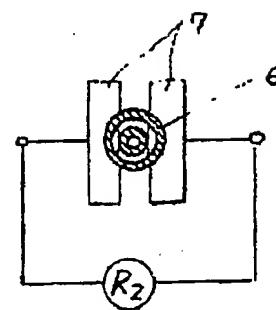


第 4 図

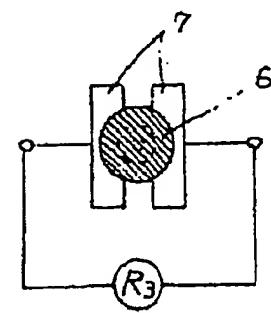
(1)



(2)



(3)



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Laid Open Utility Model HEI1-62627

(19) Japan Patent Office (JP)

(11) Publ. of Utility Model Application

(12) Publication of Laid Open Utility Model (U)

H1-62627

(51) Int. Cl³ Class/ No. Int. Control No. (43) Publ. Date: 04/21/1989

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Examination Request Yes
Certification Request: Yes
(Altogether 3 pages)

(54) Title of the Invention: Variable Resistance Rubber Switch

(21) Patent Application No.: Sho 62-156738

(22) Date Filed: October 15, 1987

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(74) Agent Attorney: Matsuda, S.

Specification

1. Title of the invention: Variable Resistance rubber switch

2. Scope Of Utility Model Registered Claims

A variable resistance rubber switch, wherein, in a switch in which the electrode and contact are arranged so as to relatively face one another, the contact is formed of elastic electro-conductive rubber, and the surface facing the electrode is not flat.

3. Detailed Explanation of the Invention

Industrial applications

The present invention relates to an improvement in the contact used in switches for each type of electronic component.

A so-called rubber switch arranged so that the electrode and contact in which conventional electro-conductive rubber is used are arranged so as to face another, is an ON-OFF switch.

In a conventional switch, there is no function for changing the state of the operation of a device corresponding to the size of the pressure force on the switch.

Structure of the invention

Therefore, with present invention, the surface facing the contact elastic electro-conductive rubber electrode is not a flat surface, and, for example, by providing a spherical or circumferential shape, or a groove across the diameter, the contact surface area between the electro-conductive elastic body and the electrode is changed corresponding to the pressure force of the switch, thereby changing the resistance value.

Since the electro-conductive contact rubber is elastic, it bends with the application of pressure, increasing the contact area between the electro-conductive contact and the electrode. Since the electrode resistance is inversely proportional to the contact area with the electro-conductive contact, there is a reduction in the resistance value with the application of pressure.

Embodiment 1

An explanation is provided next of the embodiment shown in Figure 1(1).

The electro-conductive contact rubber 2 formed from an electro-conductive elastic body on the inner surface ceiling of the centrally hollow conical spring 1 formed of insulating elastic rubber is formed with a hemispherical protrusion, which is either simultaneously formed or adhered with an adhesive. No. 3 represents a print board.

Figure 1(2) shows a slightly pressured state. Figure 1(3) shows a completely pressured state.

Also, Figure 2 shows changes in the contact surface area of the electrode 4 corresponding to the position of the electro-conductive contact rubber 2 of Figure 1, in which the contact area changes with bending of the electro-conductive contact rubber, corresponding to the pressure applied.

The state in Figure 1 (1) in which no pressure is applied is shown in Figure 2 (1), and in the state of half pressure shown in Figure 1 (2), as shown in Figure 2 (2), there is no more than a slight area in which contact occurs between the electro-conductive point rubber 2 and the electrode 4, and in the state of complete pressure shown in Figure 1 (3), contact is made across a great area such as is shown in Figure 2 (3).

Embodiment 2

Figure 3 shows another embodiment of Figure 1.

In this embodiment, electro-conductive contact rubber 6 formed on the inner surface ceiling of the spring 5 of the centrally hollow conical insulating rubber with annular unevenness. Also, changes in the contact area between the electrode 7 of the print substrate and the electro-conductive contact rubber 6 corresponding to the pressure force in the switch are shown in Figure 4. Figure 4 (2) shows a half pressure application, and Figure 4 (3) shows the application of complete pressure.

Efficacy of the invention

With such a structure, the electro-conductive contact rubber bends corresponding to the pressure force of the switch, and the contact surface area with the electrode changes. Through changes in the resistance value, not only is there simple ON-OFF switching, but a function is also possible which changes the operational state of a device.

Figure 5 is a graph which shows the difference in the relationship between the pressure force and the resistance value of a conventional switch and the switch of the present invention.

4. Brief explanation of drawings

Figure 1 is a construction summary diagram showing the state of change corresponding to the pressure force of the switch.

Figure 2 is a diagram which shows the state of change of the contact area between the electrode and the electro-conductive contact corresponding to the pressure force of the switch.

Figure 3 is a construction abbreviated drawing of a switch which shows a separate embodiment.

Figure 4 is a diagram which shows the state of change between the contact area between the electro-conductive rubber and an electrode, corresponding to the pressure force of the switch shown in Figure 3.

Figure 5 is a diagram showing the relationship between pressure force and resistance value.

- 1: spring
- 2: electro-conductive contact rubber
- 3: print board
- 4: electrode
- 5: spring
- 6: electro-conductive contact rubber

Applicant: Utility Model Registration: Fuji Rubber Co., Ltd.
Agent Attorney: Matsuda, S.



FIGURE 1

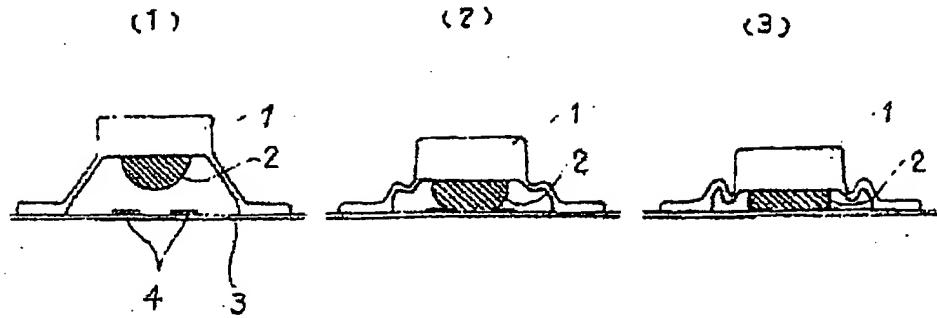


FIGURE 2

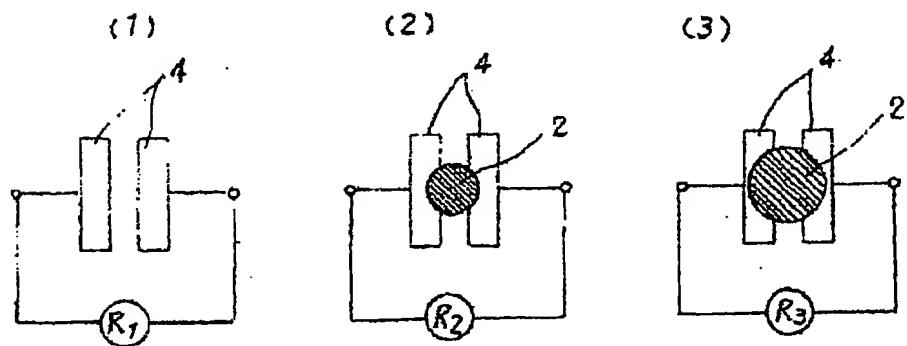




FIGURE 3

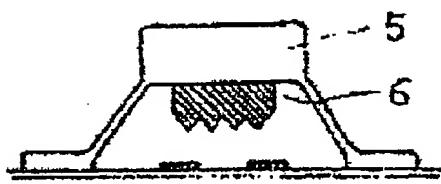
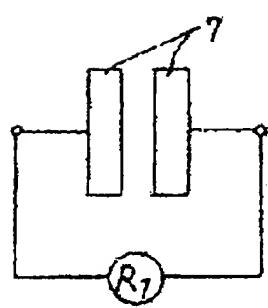
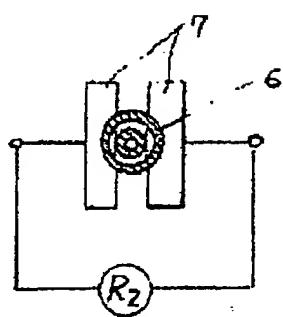


FIGURE 4

(1)



(2)



(3)

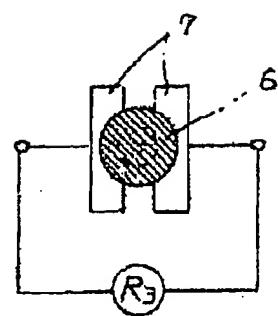
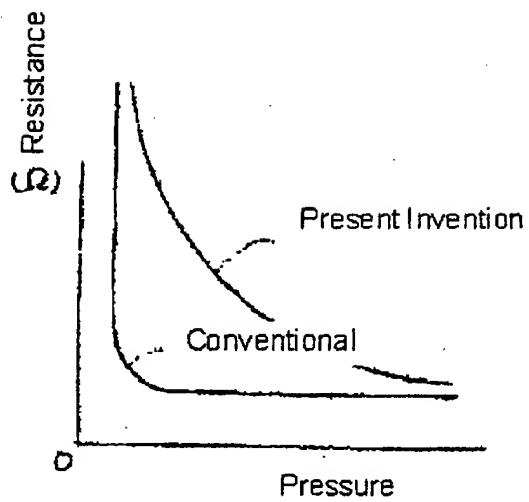


FIGURE 5



CERTIFICATE OF TRANSLATION

I Roger P. Lewis, whose address is 42 Bird Street North, Martinsburg WV 25405, declare and state the following:

I am well acquainted with the English and Japanese languages and have in the past translated numerous English/Japanese documents of legal and/or technical content.

I hereby certify that the Japanese translation of the attached translation of documents identified as

Laid Open Patent Publication
JP H1-62627
"Variable Resistance Rubber Switch"

is to the best of my knowledge and ability true and accurate.

I further declare that all statements contained herein of our own knowledge, are true, that all statements of information and belief are believed to be true.



ROGER P. LEWIS

October 24, 2006